AEROSPACE
RESEARCH APPLICATIONS CENTER

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Quarterly Report

Period February 1 through April 30, 1967

Contract Number NSR-15-003-055

INTRODUCTION

Effort during this initial quarter was concentrated on the development and implementation of work plans for each of seven project groups.

Emphasis in the planning of these projects has been placed on three sepatate but interrelated phases:

1. The development of detailed plans of accomplishment.

2. Careful structuring of the projects to allow for (where applicable) meaningful feedback from user participants.

3. Buildup of complete data on each project including experience data, development and operating guidelines, user evaluation of effectiveness, results achieved and recommendation for follow-on effort.

Each project includes a clearly defined scope of work, specified resource allocations, identified outputs, evaluation of outputs, recommended follow-on efforts, and a final report encompassing the above areas.

Plans for all projects were finalized during the quarter and a number of them are underway. Additional projects will be implemented during the next quarter. Details concerning the status of each project group are provided in the remainder of the report.

PROJECT GROUP I

Preparation of a key word in Context (KWIC) Index for all articles in the Marketing Information Service--New Dimensions in Marketing Technology announced since November, 1964 (approximately 300 articles) was initiated during the quarter. The KWIC Index will be distributed during the second quarter along with an evaluation effort to determine the usefulness of the Index.

Investigation was initiated during the quarter in several areas in which the government scientific and technical information base may provide useful outputs of potential value to industrial marketing people. These areas include behavioral science, management information systems, technology surveys for marketing, and logistics and physical distribution.

During the next quarter these areas will be narrowed down and experimental user evaluation initiated.

Standard Interest Profiles for the computer area appear feasible in: computer software for operation research, computer software for hard sciences, and computer technology highlights. Information from STAR and IAA was evaluated in these areas during the quarter. Final decisions concerning the feasibility of these Standard Interest Profiles will be made during the next quarter.

The development program for Standard Interest Profiles is presented in Appendix A. Sixty-five SIP's are under development including computer science, management science, technology, marketing, and urban planning. User evaluation of SIP's will begin during the next quarter.

A detailed development plan for the Management Science Program is contained in Appendix B. In Appendix C is a description of the Experimental Management Science Service. All activities are moving forward according to the schedule in Appendix B.

PROJECT GROUP II

The University faculty service project is a continuation of efforts initiated several years ago. During 1967 the emphasis in this area shall be placed on evaluation of the types of service and routes to the information warehouse rather than on gaining acceptance and generating activity as in past years. A major objective of this experiment is to determine the feasibility and effectiveness of providing ARAC services of the kind provided industry to faculty members operating in their differing academic roles.

All of the ARAC services will be evaluated including the subscription type services such as the Marketing Information Service, Industrial Applications Service, Computer Information Service, and Standard Interest Profiles as well as the custom services: Retrospective Searches and Custom Interest Profiles. Participants for all of the services mentioned above already are receiving these regularly. Feedback forms are under development and will be used for evaluation.

Another facet of this experiment is to test the different routes for gaining access to the ARAC information warehouse. Although the different services mentioned above accomplish this to some degree, a further test shall occur after various academic persons have been enrolled in the ARAC Residency Program described below. Various librarians from scientific academic departments shall be processed through the ARAC Residencies and thus be trained to organize the needs of the users in their respective departments. Several faculty members shall also be given an indoctrination through the ARAC Residency and thus be qualified to serve their own information needs. Plans for these residencies are in progress and they should be held during the summer recess which would be most convenient for academic persons.

The NASA Small Business Administration Project involving seven SBA selected firms was initiated in 1966. Appendix D shows a detailed listing of requests generated during the quarter. D. W. Cravens met with Parker Fairlamb and Mel Yelvington on April 6 to discuss the progress of the experiment as well as to firm up dates for contacting each firm (at the end of 12 months of service) regarding regular membership in the Center. The names of the firms, starting date of experimental services, and date of completion of project are listed below:

Company	Date of First Visit	Year Complete
Regency Electronics	3/3/66	5/1/67
Nuclear Measurements	3/15/66	5/1/67
Barnes & Reinecke, Inc.	3/8/66	5/1/67
Texscan Electronics, Inc.	5/31/66	7/1/67
Pollak and Scan, Inc.	6/3/66	7/1/67
Ordnance Engineering Assoc. Inc.	6/8/66	7/1/67
Prosthetics, Incorporated	9/8/66	10/1/67

Detailed data, user evaluation feedback, suggestions for improved information transfer mechanisms, potential problem areas, and recommendations for follow-on activity are being assembled and will be included in the final report on this project.

PROJECT GROUP III

Preliminary investigation indicates that the ARAC Residency Program should be of somewhat shorter duration than the one month period originally proposed. A more favorable approach seems to be the use of appropriate one-week sessions. These sessions shall be segregated into five separate focuses or days. The preliminary, incomplete write-up describing the residencies at the present stage of development may be found in Appendix E.

PROJECT GROUP IV

The Technology Utilization Audit program is a continuation of an effort initiated in 1966. Emphasis during the current year will be placed in developing an analytical frame of reference for identifying key questions in the area of technology transfer to industrial firms and in obtaining data from a limited number of these firms.

In order to provide a wide range of variation along dimensions believed important in information transfer five firms have been selected for inclusion in the study:

1. The ABC Division of a major U. S. Corporation was selected because it appears to be one which has very little structure in the relationship with ARAC. Individuals appear to request service as they see fit.

2. The home office of BB Company was selected because nearly all of the information flow between ARAC and the other members of the technical staff in this organization go through one individual.

3. The Central Research Laboratory of the UCP Corporation was selected because they claim to have such excellent techniques for getting information from other outside sources that a structured relationship with ARAC has been discontinued.

4. The corporate engineering office of TGT Company was selected because the structured relationship between TGT and ARAC seems to be a very "normal" one on a subjective basis, but the company appears to have a more stagnant technology than the others included.

5. HCC, Inc. was selected because it is one of the few companies using ARAC services which appears to have developed a structure and budget for using many outside information sources.

A detailed analytical framework for analysis of information transfer is being developed. Efforts will continue in the next quarter. Data will be obtained during the third quarter. Analysis and writeup of results will be accomplished in the last quarter.

PROJECT GROUP V

Individual Information - Processing and Decision-Making. The major objective of this study is an exploratory investigation of individual information-processing during the process of solving technical tasks associated with research and development projects and programs. The effort is intended to seek out the apparently important variables relating to information-processing, the individual, and the decision process within a given environment; link these variables into a conceptual analytical structure; and then investigate the existence of relationships among the variables via a field study.

The study consists of four separate, but interrelated phases. The first concerns the identification and evaluation of applicable research foundations. The second phase involves the development of a conceptual system of variables for use in identifying potential relationships and investigating them empirically. The third phase deals with the specific methodology utilized in the study. The final phase is the analysis of the data and a discussion of the results obtained via the study.

Phases one, two, and three were complete as of the end of the quarter. The study will be completed along with a final report in the next quarter.

Management Information System for a Technical Information Center. During the quarter an extensive literature review was accomplished in various disciplines such as cost accounting, information retrieval, library science, data processing, and the statistical field to determine what research had been done in the past. Most of the past work was found to be very narrow in scope and lacking in a sound theoretical accounting basis. Many of the past cost studies in the information retrieval field were based strictly on estimates.

The organization of the research project was fully developed as well as an analysis of variance model and a statistical cost control model. Also, a research questionnaire was designed that will be sent to all regional dissemination centers in May. The purpose of the questionnaire is to provide a guide for personal contacts with the centers which will take place during the month of June. In summary, the status of this research project is that all of the research methodology and organization has been developed, a large portion of the literature review has been achieved, and the research questionnaire has been designed.

Project on the Automated Maintenance and Updating of Current Awareness Profiles. The decision rules to be used in this project have been selected. There are presently five decision rules ranging from very simple to fairly sophisticated.

The Computer program which will employ these decision rules is presently under development with final debugging and check out scheduled for the second quarter.

The selection of those profiles which are to constitute the test group, for the purposes of this project, is nearing completion. It appears that the test group will consist of fifteen to twenty profiles. Of this group eight to twelve will be of the Standard Interest Profile (SIP) type with the remainder coming from custom profiles which are going to be active in the coming months.

PROJECT GROUP VI

The first quarter, February 1 to April 30, 1967, was spent in developing tentative plans for the Conference on Technology Utilization and Economic Growth which is scheduled to be held on the Indiana University campus in the period July 31 to August 4. Discussions with the members of the ARAC Advisory Board were held to invite suggestions regarding the Conference. Discussions were also held with NASA Headquarters personnel as well as with Messrs. Grogan and Robbins of the Department of Commerce.

A preliminary plan was developed and invitations extended to various persons to participate in the Conference (see Appendix F). The situation as of May 1 is indicated in the "Preliminary Program" (see Appendix F). There is every indication that the plans for the Conference can be carried out and that the program may be completed as projected.

Preliminary plans were also developed for staffing during the summer period and for the publication of the results of the Conference in the fall.

PROJECT GROUP VII

Efforts on this project were moved forward along two avenues during the quarter. The first concerned the identification of medium-sized cities in the state that would be willing to participate in the experiment. The second involved an exploratory investigation of potential technology transfer mechanism for the dissemination of appropriate scientific and technical information to meet the needs of these potential users.

During the next quarter this mechanism will be utilized to determine their applicability to the urban sector. Feedback from users will be analyzed in terms of refining and developing more effective transfer mechanisms.

Joseph DiSalvo

Joseph DiSalvo, Director
Aerospace Research Applications Center

APPENDIX A

PROPOSED STANDARD INTEREST

PROFILE DEVELOPMENT PLAN

TO: Dr. H. L. Timms March 31, 1967

FROM: Robert Hall

SUBJECT: Proposed SIP Development Program

1. The most immediate problem is to learn from the profiles we currently have on line. In order to get a quick review of the SIP effort to date, an SIP review will be conducted between April 1 and April 30. Objectives will be:

   a. To see if our original objectives for each profile are being met, and if not, why?

   b. To analyze why some of the profiles are meeting an excellent reception while others are not.

   c. Review the write-up for each profile for its "market attractiveness."

2. Concurrent with this and starting with Issue 6, USGRDR will be evaluated as a supplementary source for all SIP's now on line, as well as those still in development. However, with the exception of SIP-17, USGRDR material will not be sent out until after a review of its potential for SIP's is concluded, but abstracts relevant to each profile should be selected so that we can keep records on USGRDR effectiveness.

   A big part of this USGRDR evaluation will be to determine a better system for handling the hand edit of USGRDR and the work of reproducing the abstracts.

   Something to think about: If SIP customers get USGRDR service for $80/profile, recipients of custom profiles which cost much more may tend to be unhappy when they hear of it. So our operation may have to go completely to USGRDR.

3. Nuclear Science Abstracts will be evaluated as a source of material for SIP's, but abstracts will be selected on a trial basis only for those profiles for which the journal seems advantageous. A priori, it is not expected that NSA will contribute heavily to most profiles.

   There are problems here of abstract reproduction, and also of specifying the document ordering capability to recipients. (Some NSA reports they can get, and some they can't.) And likewise there is the problem of whether to extend this to the custom profiles.

4. Document Order Backup. If we extend SIP or our total current awareness service to encompass USGRDR and NSA, this should not be done until we have our own document reproduction capability (personal opinion). Reason: If we advertise the material, people will like it; and if they like it, the current AEC and CFSTI order system is slow and awkward. (It often takes 5-6 weeks for these orders.) Fast document service would be a very valuable added attraction--enough so that it may change our whole estimate of expected volume. To this end we should consider adding to our current microfiche collection (PB documents for example), and also consider policing the file so that microfiche are not absent for long periods. This in itself is likely to be a big task.

5. Development of SIP's in new hard science subjects: Of the 41 profiles now on line, three can be classified as Management Science. Therefore, to reach our goal of 50 SIP's in the hard science areas, twelve more profiles are needed. It is not expected that this many new profiles can be developed without using USGRDR or NSA to carry several of them with the NASA sources as supplementary material.

   Rather than announce the profiles as we get them ready individually, we should try to announce them in a group. I am setting July 1 as our target date to announce the next group of profiles. Hopefully we will have 12 profiles ready by then. In order to get twelve, we need to consider at least 20 new subjects. As of April 1, we are only working on eight, so that accurate scheduling of when they will be ready is impossible.

   Because of the long lag time inherent in our SDS computer-to-engineer linkage, we should run trial profiles on special runs rather than wait for results to osmose through "the system."

6. Management Science Service profiles: Pat Below is working in this area with Jim Hoffman and Don Lundgren. Eight profiles should be ready to announce by April 26. This area being very new to us, we should maintain a highly experimental atmosphere about them with our member firms.

   Three currently operational SIP's fit the MSS description. We are charging $80/mail point for these, but after we announce the MSS we should send letters to recipients of these profiles inviting them to participate in the MSS experiment and rescinding the fee if they do. The nature and content of the profile is likely to be changeable.

7. SIP's for Other Areas which include:

   a. Computer Information Services
   b. Marketing Information Service
   c. Urban Planning and Technology
   d. Information for Academic Users

   In our negotiation of a contract we have tended to talk about SIP's for separate areas, but in thinking of their development, I suggest we try to integrate these profiles by putting them all in a Management Science category. It appears that a major factor in designing an SIP is to do it from a user viewpoint, but it is very easy to make stereotypes of users and what they should be interested in. For example, if we are able to get a profile on computer software that is not hard science oriented, marketing people, managers, urban planners, academicians, computer specialists, and even some "hard scientists" may be interested along with some types we haven't thought of.

   This presents an interesting problem in designing and promoting each profile. It needs to identify with some group of users in order to be accepted. The bigger the group the better. But too big a group is no group at all--the old product promotion problem. However, one way to avoid the problem of over-classifying is to avoid putting groups of profiles themselves in categories, i.e. marketing, computer technology, management, urban planning, etc. In developing and promoting profiles, why not call the entire aggregation of non-hard science profiles just Management Science Service, suggesting user types for individual profiles, but not groups of profiles.

Also, it appears on the basis of early returns that the SIP's moving best are the ones for which our profile description did not hesitate to suggest types of persons who might be interested. This approach should be checked further.

The "Management Science" profiles under consideration are:

SIP-38 Quality Control and Reliability (On Line)

SIP-39 Operations Research (On Line)

SIP-40 Computer Programs (On Line)
May evolve into three profiles:
(1) Computer Software for Operations Research
(2) Computer Software for Hard Sciences
(3) Computer Technology Highlights

SIP-41 Management and Behavioral Science (On Line)
May evolve into two profiles:
(1) Personnel Management
(2) Behavioral Science for Management and Marketing

SIP-46 Management Information Systems

SIP-53 Economic Planning and Analysis

SIP-54 Industrial Problem Solving

SIP-55 Manufacturing

SIP-56 R and D Administration

SIP-58 Quality Control and Product Assurance

SIP-61 Technology Surveys for Marketing

SIP-62 Contracting and Procurement

SIP-64 Urban Planning and Technology

R.W.H.

cc: Distribution to all members of the technical staff

CURRENT SIP SUMMARY
(April 1, 1967)

No.	Title	Nov. 3 1966	Jan. 3 1967	Suggested for NASA SCAN	MSS
01	Inorganic Fiber Technology		X		
02	Crystal Growth		X		
03	Carbon & Graphite		X		
04	Physical Metallurgy	X			
05	Powder Metallurgy		X		
06	High Temp Applications--Metals	X			
07	Materials Joining Technology		X		
08	Material Forming & Machining		X	X	
09	Structural Analysis & Mat'l Properties	X		X	
10	Non-Destructuve Testing	X		X	
11	Corrosion and Protective Coatings	X			
12	PROFILE DROPPED				
13	Bearings and Lubricants	X		X	
14	PROFILE DROPPED				
15	Fluid Flow		X		
16	Hydrocarbon Fuels & Combustion	X			
17	Air & Water Polution, and Industrial Safety	X			
18	Methods of Chemical Analysis	X			
19	Reinforced Plastics	X		X	
20	Polymer Chemistry, Physics & Testing	X		X	
21	Temperature Measurement	X			
22	VACUUM TECHNOLOGY (UNDER DEVELOPMENT)				
23	Plasma Engineering	X			
24	Laser Developments	X		X	
25	Laser Research	X			

No.	Title	Nov. 3 1966	Jan. 3 1967	Suggested for NASA SCAN	MSS
26	Cryogenics and Super Conductivity		X		
27	Logic Circuits		X		
28	Infrared Technology	X			
29	Photography	X			
30	Display Systems	X			
31	Telemetry	X			
32	PROFILE DROPPED				
33	Recording Systems	X		X	
34	Semiconductor Devices & Microcircuit Fabrication	X			
35	Microwave Systems	X			
36	Radio Antennas, Transmission and Propagation	X			
37	Radio Communications Equipment	X		X	
38	Quality Control and Reliability	X			X
39	Operations Research	X			X
40	Computer Programs	X			X
41	Management and Behavioral Science		X		
42	Abnormal Environment Physiology	X			
43	Biotechnology	X		X	
44	Nuclear Biology	X			
45	Turbine Technology	X			
46	MANAGEMENT INFORMATION SYSTEMS (DEV.)				X
47	PHYSICAL CERAMICS (DEV.)				
48	GLASS TECHNOLOGY (DEV. DISCONTINUED)				
49	FEEDBACK AND AUTOMATIC CONTROL (DEV.)				
50	MECHANICAL ENGINEERING DESIGN ELEMENTS (DEV.)				

No.	Title	Nov. 3 1966	Jan. 3 1967	Suggested for NASA SCAN	MSS
51	OPTICAL SYSTEMS (DEV.)				
52	TRANSDUCERS & OTHER SENSORY DEVICES (DEV.)				
53	ECONOMIC PLANNING AND ANALYSIS (DEV.)				X
54	INDUSTRIAL PROBLEM SOLVING (DEV.)				X
55	MANUFACTURING (DEV.)				X
56	R & D ADMINISTRATION (DEV.)				X
57	CRYOGENICS (DEV. DISCONTINUED)				
58	QUALITY CONTROL & PRODUCT ASSURANCE (DEV.)				X
59	OCEANOGRAPHY (DEV.)				
60	ENERGY SOURCES (DEV.)				
61	TECHNOLOGY SURVEYS FOR MARKETING (DEV.)				X
62	CONTRACTING AND PROCUREMENT (DEV.)				X
63	INDUSTRIAL MATHEMATICS (DEV.)				
64	URBAN PLANNING (DEV.)				
65	HIGHWAY ENGINEERING (DEV.)				
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APPENDIX B

DEVELOPMENT PLAN FOR

MANAGEMENT SCIENCE PROGRAM

Development Plan

Management Science Service (MSS)

February 1, 1967 - January 31, 1968

February 1 - March 1:

I. Continuation of Phase I work from last year (monitor company profiles)

II. Develop plan for Project - submit to NASA TU Office.

March 1 - April 26:

I. Develop and refine retrieval methods for:
   A) Existing preliminary SIP's (8)
      (1) by computer) ((1) NASA file
      (2) manually) ((2) Non-NASA sources
   B) Additional SIP's to the extent possible (hopefully 7) within the constraints of:
      (1) Our current (posited) understanding of the needs of various market segments:
         (a) Hard goods-producing companies
         (b) Service-producing companies
         (c) Urban organizations
      (2) The available sources of appropriate information.

II. Prepare materials, including evaluation procedure, for presentation on MSS to attendees at April 26-27 Meeting (mailing to member and prospective member companies going out March 7-8, 1967).

April 26 - 27:

I. Presentation, including evaluation procedure, on experimental MSS to attendees - Meeting (IMU).

II. Request volunteer users from three types of organizations (see B (1) (a) (b) (c) above).

III. Individual meetings with volunteers - April 27 A.M. see preliminary program for Meeting - letter attached.
Note: Follow-up mailing will explain MSS and request for volunteer users.

IV. Interim report to NASA TU Office following Meeting, April 27.

April 27 - July 31:

I. Make regular MSS mailings to volunteer users (note: Dr. Ralph Sprague has agreed to be a "control" volunteer at Marathon Oil during period approximately June 1 - September 1)-- Approximately six mailings.

II. Evaluation of feedback from volunteer users on approximately real-time basis--for report on MSS during Summer Institute, July 31 - August 4.

III. Continue development of MSS incorporating feedback (II. above).
IV. Plan cost system to develop preliminary MSS cost.

July 31 - August 4:
I. Summer Institute (IMU).
A) Reports from MSS volunteer users.
B) Summary evaluation report by ARAC
C) Discussion - Suggestions for improving MSS.
II. Interim report to NASA TU Office following Institute.

July 31 - October 30:
I. Continue development of MSS incorporating real-time feedback from users and decisions from Summer Institute.
II. Continue regular mailings to users (approximately 6).
III. Collect cost data - evaluate by October 1 for possible incorporation in Fee Schedule.
IV. Continue evaluation of MSS for interim report to NASA TU Office shortly after October 30.

October 30 - January 31:
I. If cost information and evaluation (III and IV above) favorable, and MSS incorporated in 1968 Fee Schedule,
A) Continue to monitor MSS and evaluate effectiveness on real-time basis.
B) Continue to collect cost data for preliminary cost verification.
C) Final report to NASA TU Office shortly after January 31.
II. If MSS not incorporated in Fee Schedule (I above),
A) Continue to monitor MSS and evaluate effectiveness and costs till January 31.
B) Develop recommendation for continuance or discontinuance of MSS Project in 1968.
C) Final report to NASA TU Office shortly after January 31 incorporating (B) above.

NOTE: Visits to volunteer users for evaluation purposes are to be incorporated in visits made for other purposes whenever possible. Evaluation report to be turned in after each visit, separately from regular Trip Report. Visits solely for MSS evaluation purposes to be cleared with Director beforehand.

APPENDIX C

EXPERIMENTAL MANAGEMENT

SCIENCE SERVICE

AEROSPACE RESEARCH APPLICATIONS CENTER

Indiana University, Bloomington, Indiana

EXPERIMENTAL MANAGEMENT SCIENCE SERVICE

1967

Background

As a result of ARAC's continuing efforts to help meet the scientific and technical information needs of a wide variety of users, ARAC is pleased to announce an experimental service during 1967 entitled the Management Science Service (MSS).

Since its formation in 1962, ARAC has devoted its efforts primarily toward servicing the scientific and technical information needs of the industrial community. By focusing on the various "hard science and technical" areas such as chemistry, physics, metallurgy, etc., our efforts have been directed largely toward servicing the information needs of goods-producing companies.

What might be termed "soft science" areas have only been served on an ad hoc basis, largely through the use of custom interest profiles in the Selective Dissemination Service and retrospective searches on specific problems or questions of a managerial and economic nature. This experience over a four year period led to the decision to develop a comprehensive service in Management Science that would be useful not only to goods-producing companies, but also to service-producing companies (e.g. transportation, banking, etc.) public administrators, educators, and industrial planners, among others.

Description--Management Science Service

Our initial approach to the Management Science Service is based on the use of Standard Interest Profiles (SIP's) by means of which ARAC's computerized information base is periodically (generally every two weeks) searched. The basic idea behind the use of SIP's is to provide a current awareness of incoming reports covering a predefined area of interest on a continuing basis. The important thing to note here is the use of the term "pre-defined".

In the past, ARAC has developed a large number of "custom" interest profiles in its Selective Dissemination Service. It was the intent of these profiles to be designed to serve the interest of a particular individual or group. As a result of this experience, ARAC noted that one of the most persistent problems faced by prospective recipients of a current awareness service from government literature is "What should I ask for?".

The immediate advantages of using Standard Interest Profiles are: First, by having ARAC take the initiative in defining a particular subject or area, the user can quickly determine the extent of his interests in the area. Since Standard Interest Profiles are developed using the criteria of general, rather than individual user-interest, as well as ARAC's ability to consistently provide reports in the area, these profiles can be used to guide prospective users in choosing those profiles which best fit their needs. Second, an advantage of SIP's over the use of custom profiles is their economy. The well-known economic benefits of standardization result in a lower unit cost for standard profiles than for custom profiles.

Since "Management Science" is a generic term, and thus subject to different interpretations, it is important to specify both ARAC's objective and definition regarding the development of this service. Basically the Management Science Service will be directed to the major phases of research, development, and application of various economic and management-related planning and control procedures, methods, tools and techniques. To accomplish this goal ten Standard Interest Profiles have been designed as a starting point. This initial list of profiles is intended to include both the "tool" or technique-oriented areas of Management Science as well as the applied areas. ARAC's definition of Management Science can best be expressed in terms of the subject areas covered by these ten Standard Interest Profiles listed below. A description of each of these profiles is contained in Appendix I attached.

Applied Areas	Tool Areas
Production Control & Manufacturing Engineering	Operations Research
Quality Control	Economic Planning and Cost Analysis
Management Information Systems	Logistics and Distribution Analysis
Personnel Management-Behavioral Sciences	Computer Technology
R & D Administration	Product Assurance and Reliability Design

In reviewing the various profile write-ups in Appendix I, two factors should be noted. First, the profiles are interdependent to the extent that there will be some overlap between them. For instance, the two profiles Production Control and Manufacturing Engineering and Logistics and Distribution Analysis may both contain citations to the same inventory control report. Second, the majority of profiles have been formulated to

service both the specialist as well as the generalist or manager responsible for a particular area. Each profile description should be studied carefully to determine the extent of user-interest in the area.

Information Base

The Management Science Service will provide a unique opportunity for its various subscribers to benefit from the available information on complex management problems and programs found within the government areas. Although there are numerous hard science and technical accomplishments resulting from NASA's Space Program, major efforts are being accomplished in the various planning, coordinating and controlling activities which are necessary to support such a major undertaking.

Since the bulk of our information base includes the NASA contractor reports as well as reports issued by the Departments of Defense and Commerce, we are optimistic in being able to provide relevant information regarding the economic and managerial-related problems of business, education and public administration officials. It is worthwhile pointing out that many of the current tools and techniques of management planning and control such as Operations Research, PERT, CPM, and Systems Analysis have been developed in connection with various government activities. Thus, ARAC's Management Science Service should provide a means of keeping abreast of most of the latest developments in this area.

In addition to the government report literature, a wide range of periodical literature is included in the NASA information file available to ARAC. During 1965 and 1966 the number of these periodicals approached 1,000 many of which were foreign publications.

Evaluation of Service

Because the Management Science Service is initially being conducted on an experimental basis prior to being made a permanent ARAC service, it is felt that a certain amount of early feedback will be needed from users of this service. In order to enlist the cooperation of those users who would like to assist ARAC in evaluating the Management Science Service during its early stages, ARAC will provide, on a no-charge basis, a selected number of Management Science Standard Interest Profiles in exchange for participating in the valuation of our new service. Another advantage, of course, in helping us evaluate the effectiveness of this service is that each user's comments and criticisms will be carefully considered in terms of the future development of the Management Science Service.

Regarding generally what will be expected on the part of those users who desire to provide us with feedback, the evaluation plan will consist of:

(1) completion of a one-page profile evaluation sheet to be attached with each profile mailing;

(2) following every three or four mailings (six to eight weeks), completion of a short questionnaire by those individuals reviewing the profile (the maximum number of such questionnaires will be three);

(3) in certain cases, ARAC may want to follow-up individual profile evaluations or questionnaires by telephone call or by visit.

Please be assured that ARAC will minimize the amount of time required on each user's part as far as the evaluation of the service is concerned. However, because of the relatively short period of time available to evaluate the service, we request the cooperation of all those involved.

To signify your interest in receiving the Management Science profiles (maximum of four) at no charge, a 'sign-up" sheet is available as Appendix II attached. Those users who wish to receive the service but do not wish to participate in the evaluation process, simply indicate this on the sign-up sheet.

Sample Profile Output

In order to acquaint you with the output (both in form and content) of the experimental Management Science Service, sample packets of each profile output in the form of abstracts have been prepared. Each sample packet contains abstracts from three consecutive current awareness searches of ARAC's information base, thus providing a representative sample of the type of material which will be found under the various Standard Interest Profiles. By reviewing these sample packets along with the corresponding description of the profile, the potential user will be better able to select those profiles which are of particular interest to him.

APPENDIX I

Standard Interest Profiles--Management Science Service

Production Control and Manufacturing Engineering (SIP-55)

Due to the nature of the activities performed within the manufacturing or production function, many areas within this function have and are receiving considerable attention from a "scientific management" viewpoint. The major emphasis in this profile will be on inventory control and production scheduling and forecasting. Information regarding the use of such techniques as linear programming, PERT, CPM, etc. will be included. Also information related to the technical or engineering activities of production such as plant layout, process design, time standards, methods improvement, maintenance improvement, etc. will also be covered, although there is not a large volume of material in these areas.

Quality Control (SIP-38)

This profile will treat Quality Control in the traditional sense. Thus it will contain reports primarily relevant to the measurement and control of current quality levels and audits. Specific topics to be covered include sampling theory, statistically-oriented tests, control charts, confidence intervals, inspection procedures, etc. The emphasis will be on procedural-type information, few reports included will discuss such technically related areas as instrumentation or non-destructive testing.

Management Information Systems (SIP-46)

The managerial or decision making point of view is adopted in selecting relevant abstracts dealing with the systematic analysis, design, implementation and operation of information systems. This covers a broad range of topics including the use of computer facilities and the man-machine interface. Related activities such as documentation, library science, information retrieval, data management, and systems and procedures will be considered as forming a part of this profile, but highly quantitative or specialized reports will be avoided.

Personnel Management--Behavioral Sciences (SIP-41)

This profile is designed to cover the major areas of behavioral science (i.e. psychology, social psychology, sociology and industrial psychology) as well as specific activities related to the Personnel Management or Industrial Relations function. Regarding the general areas, recent research on such topics as leadership, motivation, morale, productivity, human engineering, and organization theory will be included. Concerning the personnel function, relevant areas will be personnel selection, testing, job analysis, training, manpower planning and recruiting. In addition to individuals in personnel, this profile will be of benefit to individuals or groups interested in current research, development or application of the behavioral sciences to organizational problems. NASA and Department of Defense agencies have done a great deal of work in these areas.

R & D Administration (SIP-56)

Program or project management has becomea "modus operandi" not only in the government sector but also in the organization and management of complex program or projects in the industrial organization. This profile attempts to cover, mainly from an administrative point-of-view, many of the facets related to the planning, implementation, operation and evaluation of this area. Topics of a general management interest such as management development, systems engineering activities, the impact of technology on industry and society, etc. will also be included. This profile is aimed primarily at the managerial level, particularly in the area of research and development, but due to the scope of its coverage, it should be of interest to individuals in other areas as well. Because of the general applicability of these techniques this profile should also be of interest to urban planners and others.

Operations Research (SIP-39)

This profile is concerned with the area of quantitative analysis as defined by a number of established Operations Research techniques such as linear and non-linear programming, queuing theory, Markov processes, and dynamic programming. Its purpose is to serve both the theoretician and practitioner in operations research and quantitative business analysis, but at an advanced level. Also reports of a methodological nature will be included as they relate to model formulation and experimental analysis. Topics in these areas will consist of probability theory, statistics, analysis of variance, experimental design, special optimization techniques, calculus of variations and decision theory.

Economic Planning & Cost Analysis (SIP-53)

This profile will focus on recently-developed economic planning and control methods which are being actively employed by the Department of Defense and other government agencies. The profile will cover such activities as systems analysis, cost-benefit analysis, cost-effectiveness and planning-programming-budgeting. These techniques should provide relevant insight into the latest methodologies being applied to the systematic planning, analysis and evaluation of complex programs or projects. This profile should be of direct benefit to individuals or groups engaged in such activities as long-range planning, cost or budgeting analysis, R & D planning and evaluation, urban planning, and financial analysis. It will also prove useful to persons engaged in economic study and analysis of large-scale systems in general.

Logistics and Distribution Analysis (SIP-54)

The purpose of this profile is to cut across the major functional areas of business (manufacturing, finance, marketing, production) to

cover those activities (both primary and supporting) which are related to the flow of material from the ordering of raw material to the delivery of finished goods. Techniques involving value analysis, automated data processing, materials management, materials handling, transportation and traffic management, scheduling, inventory control, packaging, etc. will be included. This profile should be of interest to either line or staff personnel who are concerned with these activities.

Computer Technology (SIP-40)

Computer software is the main subject of emphasis with many reports discussing specific programs and subroutines. Most reports on computer hardware will be suppressed, but ones that are included should highlight innovations of general interest. This profile is geared to serve computer specialists or knowledgeable individuals in the area of computers. Its purpose is to bring to the attention of the computer group a sampling of the most recent trends and developments in the area.

Product Assurance and Reliability Design (SIP-58)

This area will be concerned with activities related to product design, test and analysis. Topics which will be included are failure analysis, failure testing, life testing, test design, etc. With the expanding interest of design management for quality and reliability, the "modern" view of Quality Control has taken on increased scope and the profile is designed to cover the entire spectrum of these activities. Some of these are maintainability engineering, incorporating reliability into design, reliability management, etc.

APPENDIX II

Sign-up Sheet for Participation in the ARAC Experimental Management Science Service

To participate in the evaluation of ARAC's experimental Management Science Service, two qualifications are necessary:

(1) Each agency, organization, and company should limit themselves to three mailing points and a maximum of four profiles for each mailing point.

(2) Sign up by June 1, 1967, at the latest in order to receive a sufficient number of abstracts for evaluation purposes.

To participate in this experimental service, please fill in the spaces provided below:

MAILING POINT:

NAME: _____ DATE: _____

REPRESENTING: _____

ADDRESS: _____

_____

_____

ADDITIONAL MAILING POINTS (If different from above):

NAME: _____

ADDRESS: _____

_____

_____

NAME: _____

ADDRESS: _____

_____

_____

PROFILES DESIRED (A maximum of four per mailing point--for more than one mailing point, identify desired profiles with 1, 2, or 3 to correspond with the other of the above listings):

_____ Operations Research
_____ Economic Planning and Cost Analysis
_____ Computer Technology
_____ Product Assurance and Reliability Design
_____ Logistics and Distribution Analysis
_____ Production Control & Manufacturing Engineering
_____ Quality Control
_____ Management Information Systems
_____ Personnel Management-Behavioral Sciences
_____ R & D Administration

(Have each of the mailing points received copies of the sample profile output consisting of three consecutive mialings as described in the write-up of this service?
_____ Yes _____ No)

APPENDIX D

ACTIVITY STATEMENT FOR SEVEN

NASA/SBA SMALL BUSINESS EXPERIMENTS

	February	March	April	Total
Barnes and Reinecke, Inc.				
IAS	16	39	29	84
RSS	-	-	-	-
DOC	7	-	2	9
MIS	10	-	11	21
CIS	-	-	-	-
Nuclear Measurements Corporation				
IAS	-	-	1	1
RSS	-	-	-	-
DOC	-	-	-	-
MIS	-	-	-	-
CIS	-	-	-	-
Ordnance Engineering Associates				
IAS	4	9	4	17
RSS	-	-	-	-
DOC	-	-	1	1
MIS	-	10	-	10
CIS	-	-	-	-
Pollak and Skan, Incorporated				
IAS	1	5	17	23
RSS	-	-	-	-
DOC	-	-	-	-
MIS	-	4	2	6
CIS	-	-	-	-
Prosthetics, Incorporated				
IAS	2	1	-	3
RSS	-	-	-	-
DOC	-	3	-	3
MIS	-	-	-	-
CIS	-	-	-	-
Regency Electronics, Inc.				
IAS	2	2	2	6
RSS	-	-	-	-
DOC	-	3	4	7
MIS	-	-	-	-
CIS	-	-	-	-
Texscan Corporation				
IAS	1	-	-	1
RSS	-	-	-	-
DOC	-	-	-	-
MIS	-	3	-	3
CIS	-	-	-	-

APPENDIX E

PRELIMINARY ARAC

RESIDENCY PROGRAM

AEROSPACE RESEARCH APPLICATIONS CENTER

ORIENTATION SERIES

FOCUS I: TECHNOLOGY UTILIZATION TRANSFER

A. Nature and History of T. U. Effort — 9:00 - 10:00

B. ARAC Approach to T. U. — 10:15 - 11:15

C. Brief Discussion of Each ARAC Service — 11:15 - 12:00, 1:15 - 3:15

Selective Dissemination Service (SDS) is a dynamic, custom review of a specific interest area. Twice monthly the computer reviews thousands of technical reports which are further edited by an ARAC specialist who is in close and continous communication with the company representative.

Standard Interest Profile (SIP) is a broad approach to certain high-interest areas. The same documents that are reviewed for SDS are searched for SIP, but editing by the ARAC specialist is more general in nature.

Retrospective Search Service (RSS) is a search of the entire information base isolating information relevant to a specific company problem.

Industrial Applications Service (IAS) is a weekly mailing of technical reports that have broad industrial application.

Marketing Information Service (MIS) selects outstanding articles from the monthly New Dimensions in Marketing Technology on the basis of new developments, market research methods and other quantitative techniques.

Computer Information Service (CIS) is designed to transfer the technology of new computer program developments: specific programs and computer oriented reports.

D. ARAC - Member Company Relationships — 3:30 - 4:30

In its history ARAC has affected many successful instances of NASA technology transfers. These examples are the result of the two-way communication that exists between ARAC specialists and member company personnel: telephone contacts, output evaluation, visits to company operations. At all times company proprietary positions are respected.

FOCUS II: OVERALL ARAC SYSTEM

A. Tour of Facilities 9:00 - 11:00

Review of operational and computer facilities, and supporting activities.

B. Discussion with Director of Operations 11:00 - 12:00

Review of staff, assignment of member company inquiries, flow of operations, general objectives.

C. Discussion with Business Manager 1:15 - 2:00

Review of present and previous price schedules, billing procedures.

D. Discussion with Cost Accountant 2:15 - 3:00

Review of costing methods and rationale of pricing procedures.

E. Discussion with Document Reproduction Manager 3:15 - 4:30

Review of methods and procedures for reproduction of items for internal and external use.

FOCUS III: DETAILED OBSERVATION OF CUSTOM OPERATIONS

A. Retrospective Search Service 9:00 - 12:00

Study of a specific search from start to finish: computer search strategy, interaction with inquirer, additional contacts and sources of information, editing of computer output, format of mailing.

B. Selective Dissemination Service 1:15 - 4:30

Study of sources of information, computer logic selection, interaction with member company, updating of profile, editing of output, format and procedure of mailing.

FOCUS IV: DETAILED OBSERVATION OF GENERAL SERVICES

A. Standard Interest Profiles 9:00 - 10:45

Review of SDS vs. SIP, sources of information, choice of topics, determination of output.

B. Marketing Information Services 11:00 - 12:00

Review of sources of information, criteria for selection, reproduction methods, mailing procedures, inventory system.

C. Industrial Applications Report 1:00 - 3:15

Review of sources of information, criteria for selection, reproduction methods, mailing procedures, inventory system.

D. Computer Information Service 3:30 - 4:30

FOCUS V:

A. Discussion with Manager of Informations Systems 9:00 - 12:00

Review of computer logic, comparison of weighted term vs. Boolion logic.

B. Visit to Nearby Member Company 1:00 - 4:30

To give the visitor an opportunity to see how ARAC services are coordinated and implemented in a typical company.

APPENDIX F

PRELIMINARY PROGRAM FOR

TECHNOLOGY UTILIZATION INSTITUTE

NATIONAL CONFERENCE ON
TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH
July 31 - August 4

Indiana Memorial Union
Bloomington, Indiana

SUNDAY, July 30

5:30 p.m. Early Bird Reception and Buffet

MONDAY, July 31

9:00 a.m. Opening Session

Welcoming Remarks: Elvis J. Stahr, President, Indiana University
Herman B Wells, Chancellor, Indiana University, and Chairman of the Aerospace Research Applications Center

TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH: AN OVERVIEW

Moderator: Arthur M. Weimer, Special Assistant to the President, Indiana University

Panelists: Gerhard Colm, Chief Economist, National Planning Association
Edward F. Denison, The Brookings Institution
Robert C. Turner, Distinguished Service Professor of Business Economics and Public Policy, Indiana University
George W. Wilson, Chairman, Economics Department, Indiana University

11:45 Luncheon

Speaker: Sumner Myers, Institute of Public Administration, "Technological Transfer and Industrial Innovation"

1:15 p.m. THE ROLE OF THE BUSINESS SCHOOL IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman: W. G. Pinnell, Dean of the Graduate School of Business, Indiana University

Moderator: Paul V. Grambsch, Dean of the School of Business Administration, University of Minnesota

Panelists: Donald J. Hart, Dean of the College of Business Administration, University of Florida
Brigadier General J. M. Kenderdine, Commanding Officer, Defense Personnel Support Center
Other panelists to be announced

3:30 Recreation Period

MONDAY, July 31

6:00 p.m. Reception

7:00 Dinner

8:30 Informal Discussion Session

TUESDAY, August 1

9:00 a.m. THE ROLE OF THE ENGINEERING SCHOOL IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman:

Moderator: George A. Hawkins, Dean, Engineering Schools, Purdue University

Panelists: To be announced

11:45 Luncheon

Speaker: H. E. Riley, National Science Foundation, "Investment in R & D: The $23 Billion Question"

1:15 p.m. URBAN ADMINISTRATION, TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman: Byrum Carter, Dean of the College of Arts and Sciences, Indiana University

Moderator: Lyle C. Fitch, President, Institute of Public Administration

Panelists: To be announced

3:30 Recreation Period

6:00 Reception

7:00 Dinner

8:30 Informal Discussion Session

WEDNESDAY, August 2

9:00 a.m. THE ROLE OF FEDERAL GOVERNMENT PROGRAMS IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman:

Moderator: George J. Howick, Director, Technology Utilization Division, NASA

WEDNESDAY, August 2

9:00 a.m. Panelists: Monroe Freeman, Director, Science Information Exchange
Paul J. Grogan, Director, Office of State Technical Services
Edward Brunenkant, Director, Technical Information Division, Atomic Energy Commission
Marshall Grotenhuis, Director, Office of Industrial Cooperation, Argonne National Laboratory
Charles McCabe, Director, National Referral Center, Library of Congress

11:45 Luncheon

Speaker: To be announced

1:15 p.m. FINANCIAL INSTITUTIONS, TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman:

Moderator: E. E. Edwards, Fred T. Greene Professor of Finance, Indiana University

Panelists: John Westergaard, President, Equity Research Associates
Other panelists to be announced

3:30 Recreation Period

6:30 Dinner: Pic A Chic Ranch

THURSDAY, August 3

9:00 a.m. THE ROLE OF RESEARCH INSTITUTES IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman:

Moderator: James Alcott, Director, Economic Development Division, Midwest Research Institute

Panelists: To be announced

11:45 Luncheon

Speaker: John Duberg, Assistant Director, Langley Research Center, NASA

1:15 p.m. THE ROLE OF BUSINESS FIRMS IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman: Oscar L. Dunn, Vice President, General Electric Company

Moderator:

THURSDAY, August 3

1:15 p.m. Panelists: Robert L. Adams, Vice President, Esterline Angus Instrument Company, Inc.
David H. Fax, Technical Assistant to Vice President-Engineering, Westinghouse Electric Corporation
R. A. Gaiser, Vice President, Research and Product Development, Ball Brothers Research Corporation
G. H. Stempel, Research Center Administrator, The General Tire & Rubber Company
John A. Swartout, Director of Technology, Union Carbide Corporation

3:30 Recreation Period

6:00 Reception
7:00 Dinner

8:30 p.m. THE IMPACT OF NASA R & D PROGRAMS ON MANAGEMENT AND ECONOMIC GROWTH

Moderator: L. L. Waters, Acting Chairman, Department of Finance, Indiana University

Panelists: John F. Mee, Dean of the Division of General and Technical Studies, and Mead Johnson Professor of Management, Indiana University
George W. Wilson, Chairman, Economics Department, Indiana University

FRIDAY, August 4

9:00 a.m. EDUCATIONAL NEEDS IN TECHNOLOGY UTILIZATION AND ECONOMIC GROWTH

Session Chairman:

Moderator: Richard L. Lesher, Assistant Administrator, NASA

Panelists: To be announced

11:45 Luncheon

Speaker: To be announced

2:00 ADJOURNMENT OF CONFERENCE

Review and Planning Meeting of Advisory Board

Note: Each morning there will be a fifteen minute coffee break at 10:00.